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IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :  
JIRO HIRAIWA, ET AL. : EXAMINER: ZHENG, LOIS L.  
SERIAL NO: 10/661,638 :  
FILED: SEPTEMBER 15, 2003 : GROUP ART UNIT: 1793  
FOR: FLUORINE GAS GENERATOR :

APPEAL BRIEF

COMMISSIONER FOR PATENTS  
ALEXANDRIA, VIRGINIA 22313

SIR:

Appellants appeal the outstanding Final Rejection of August 20, 2008

I. REAL PARTY IN INTEREST

The real party in interest in the present application is the assignee of the present application, Toyo Tanso Co., LTD. Having a place of business at 7-12 Takeshima 5-Chome, Nishiyodogawa-ku, Osaka, 555-0011, Japan.

II. RELATED APPEALS AND INTERFERENCES

Appellants, Appellants legal representative, and the assignee are not aware of any other interferences or judicial proceedings that may be related to, directly affect or be directly affected by, or have a bearing on the Boards decision in the pending Appeal.

### III. STATUS OF THE CLAIMS

Claims 1-8, 10, and 12 are pending in the application. Each of claims 1-8, 10, and 12 stands rejected. Each of claims 1-8, 10, and 12 is being appealed.

Claims 9 and 11 were canceled.

### IV. STATUS OF THE AMENDMENTS

No amendment was filed subsequent to the Final Rejection of August 20, 2008.

### V. SUMMARY OF THE CLAIMED SUBJECT MATTER

#### Independent Claim 1

Independent claim 1 recites, with references to Figures 1-3 in the specification as non-limiting examples, a fluorine gas generator comprising:

a box-shaped body 100 containing an electrolyzer 1 for fluorine gas generation, the box-shaped body being partitioned into at least three compartments 101, 102, 103 separated from each other by internal partition walls 105, 106 such that gases in the at least three compartments do not mix together (specification at page 6, lines 1-10).

The box-shaped body 100 includes:

a first compartment 101 containing the electrolyzer 1 (specification at page 6, lines 9-10);

a second compartment 102 containing a first adsorption unit 15 that adsorbs hydrogen fluoride from fluorine gas discharged from an anode chamber 3 of the electrolyzer 1 (specification at page 6, lines 23-25); and

a third compartment 103 containing a second adsorption unit 14 that adsorbs hydrogen fluoride from hydrogen gas discharged from a cathode chamber 4 of the electrolyzer 1 (specification at page 6, line 35 to page 7, line 1).

The second compartment 102 and the third compartment 103 are respectively provided directly adjacent to the first compartment 101, and the first compartment 101 is located between the second compartment 102 and the third compartment 103 so that the second compartment 102 and the third compartment 103 are not in contact with each other (see Figures 1-3 and specification at page 9, lines 4-7).

#### Independent Claim 2

Independent claim 2 recites, with references to Figures 1-3 in the specification as non-limiting examples, a fluorine gas generator comprising:

an electrolyzer 1 containing an electrolytic bath 2 composed of a mixed molten salt containing hydrogen fluoride and divided into an anode chamber 3 with an anode 5 disposed therein and a cathode chamber 4 with a cathode 6 disposed therein (specification at page 6, lines 11-15),

a first adsorption unit 15 that adsorbs hydrogen fluoride from the fluorine gas discharged from the anode chamber 3 (specification at page 6, lines 23-25),

a second adsorption unit 14 that adsorbs hydrogen fluoride from the hydrogen gas discharged from the cathode chamber 4 (specification at page 6, line 35 to page 7, line 1),

a box-shaped body 100 containing the electrolyzer 1, the first adsorption unit 15, and the second adsorption unit 14 (specification at page 6, line 1 to page 7, line 1).

The box-shaped body 100 comprises three compartments 101, 102, 103 separated from each other by internal partition walls 105, 106 such that gases in the at least three compartments do not mix together (specification at page 6, lines 1-6), and including a first compartment 101 containing the electrolyzer 1 (specification at page 6, lines 9-10), a second compartment 102 containing the first adsorption unit 14 (specification at page 6, lines 23-25), and a third compartment 103 containing the second adsorption unit 14 (specification at page 6, line 5 to page 7, line 1).

The second compartment 102 and the third compartment 103 are respectively provided directly adjacent to the first compartment 101, and the first compartment 101 is located between the second compartment 102 and the third compartment 103 so that the second compartment 102 and the third compartment 103 are not in contact with each other (Figures 1-3 and specification at page 9, lines 4-7).

### Claim 3

Claim 3 recites each of the first to third compartments 101, 102, 103 is provided with a suction opening 41, 42, 43 for suctioning the internal air (Figure 2, specification at page 9, lines 9-10, page 9, lines 29-31, page 10, lines 13-15).

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

Claims 1-8, 10, and 12 were rejected under 35 U.S.C. § 103(a) as unpatentable over WO 01/77412 to Tojo et al., whose corresponding U.S. patent is U.S. patent 6,818,105 B2 to

Tojo et al. (herein “Tojo”),<sup>1</sup> in view of U.S. patent 4,790,859 to Marumo et al. (herein “Marumo”), and further in view of JP 2000-160390 to Fumio et al. (herein “Fumio JP ‘390”).

## VII. ARGUMENT

**Claims 1-8, 10, and 12 recite “said second compartment and said third compartment are respectively provided directly adjacent to said first compartment, and said first compartment is located between said second compartment and said third compartment so that said second compartment and said third compartment are not in contact with each other”, which is not taught or suggested by the applied art.**

No combination of teachings of the applied art to Tojo, Marumo, and in view of Fumio (JP ‘390) discloses or suggests the features recited in each of independent claims 1 and 2 that:

wherein said second compartment and said third compartment are respectively provided directly adjacent to said first compartment, and said first compartment is located between said second compartment and said third compartment so that said second compartment and said third compartment are not in contact with each other.

With respect to those noted claim features, and with reference to Figures 1-3 in the present specification as a non-limiting example, in the claimed fluorine gas generators a second compartment 102 and a third compartment 103 are provided directly adjacent to a first compartment 101. Further, the first compartment 101 is located between the second compartment 102 and the third compartment 103 so that the second compartment 102 and the third compartment 103 are not in contact with each other.

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<sup>1</sup> The outstanding Final Rejection appears to include a typographical error in referring to the noted U.S. patent as no. 6,518,105 B2 when that number appears to properly be U.S. patent 6,818,105 B2.

As also recited in each of independent claims 1 and 2, the first compartment 101 includes an electrolyzer 1, the second compartment 102 includes a first absorption unit 15 that absorbs hydrogen fluoride from fluorine gas discharged from an anode chamber 3 of the electrolyzer 1, and the third compartment 103 includes a second absorption unit 14 that absorbs hydrogen fluoride from hydrogen gas discharged from a cathode chamber 4 of the electrolyzer 1.

In addressing the above-noted features the outstanding Final rejection states:

JP'390 teaches separating the control system and the electroplating cell in separate rooms and the oxygen and hydrogen gases are also discharged in these separate rooms to avoid potential hazardous or unsafe conditions due to cross-contamination(paragraph [0045, 0057]). In addition, JP'390 does not require that the separate rooms for housing the control system and the electroplating cell to be located away from each other. Therefore, the examiner considers two rooms located right next to each other with a shared wall within the scope of JP'390's invention.

Therefore, it would have been obvious to one of ordinary skill in the art to have incorporated the multi-room housing of JP'390 into the apparatus of Tojo'105 in view of Marumo to separately house the electrolyzer, the equipments used to process the hydrogen gas product including the first adsorption unit and the equipments used to process the fluorine gas product including the second adsorption unit in order to avoid cross contamination as taught by JP'390 (abstract, paragraph [0017]).

Regarding claims 1-2, including the amended feature, one of ordinary skill in the art would have also found it obvious to put the hydrogen and fluorine gas product processing equipments, including the first and second adsorption units, in separate rooms on each side of and adjacent to the room for housing the electrolyzer as taught by Tojo'105 in view of Marumo and JP'390, since both sets of gas product processing equipments are directly downstream from the anode and cathode chambers and such housing arrangement would minimize the piping required to transport the gas products to respective adsorption units. Therefore, the first housing for electrolyzer as taught by Tojo'105 in view of Marumo and

JP'390 is located between the second housing for the first adsorption unit as taught by Tojo'105 in view of Marumo and JP'390 and the third housing for the second adsorption unit Tojo'105 in view of Marumo and JP'390 so that the second and the third housing are not in contact with each other as claimed.

The above-noted basis for the outstanding rejection is improper as none of the cited art to Tojo, Marumo, or Fumio (JP '390) discloses or suggests the specific layout and structure of the first, second, and third compartments. The outstanding rejection appears to cite Fumio (JP '390) to provide a teaching to incorporate the above-noted claim structure, but Fumio (JP '390) simply does not disclose or suggest the specific structure as claimed, and particularly does not disclose or suggest a layout in which a first compartment is located between second and third compartments so that the second and third compartments do not contact each other.

**The Applied Art only Discloses the use of Two Separate Rooms, not Three Compartments as Claimed**

Fumio (JP '390) merely discloses placing an electrochemical plating device and a control system in *two* separate rooms to avoid contamination of the electrochemical plating device when the control system undergoes maintenance work. Even assuming such a feature in Fumio (JP '390) is similar to the claimed first, second, and third compartments, which applicants dispute as discussed further below, clearly that disclosure in Fumio (JP '390) of utilizing *only two* separate rooms does not correspond to the claimed features directed to **three** compartments such that "said first compartment is located between said second compartment and said third compartment so that said second compartment and said third compartment are not in contact with each other." No disclosure in any of Tojo, Marumo, nor Fumio (JP '390) is directed to such claimed features.

Applicants particularly traverse the position that one of ordinary skill in the art would derive from the teachings of Fumio (JP '390) to isolate other components of an electrolyzer.

The disclosure in Fumio (JP '390) should be considered for what it teaches, which is merely utilizing *two* separate rooms such that a plating section is installed in a first room and a management department is installed in a separate room. In that respect, Fumio (JP '390) discloses O<sub>2</sub> and H<sub>2</sub> gas can be discharged to different places by placing a plate section and control section in different chambers. The actual teachings in Fumio (JP '390) are *not* at all directed to providing three separate housings for isolating electrolyzer units or other units to avoid cross-contamination.

**The Claims Isolate Specific Components in the Three Compartments**

The applicants of the present invention recognized that in a fluorine gas generator as recited in amended independent claims 1 and 2, several components exist that may increase the risk of a gas leakage, such as a valve and a branch, in the vicinities of a first absorption unit and a second absorption unit.

The applicants of the present invention specifically recognized that in a fluorine gas generator including a supply system in which raw material gas (e.g. hydrogen fluoride) is supplied and a discharge system in which generated gas (e.g. hydrogen and fluorine) are discharged, provided adjacent to each other, and in which the discharge system and the supply system are not separated by a partition wall, if the raw material gas leaks in the supply system and the generated gas leaks in the discharge system, atmospheric pressure becomes higher in the supply system and lower in the discharge system, which causes a status such that a differential pressure between the supply system and discharge system is more likely to



occur. In such situations gas may move from the supply system to the discharge system, and thereby the generated gas and the supplied gas are likely to be mixed.

To address such problems recognized by the applicants of the present invention, the second compartment 102 and the third compartment 103 that respectively contain the first absorption unit 15 and the second absorption unit 14 are located so as not to be in contact with each other, and in fact are separated by a first central compartment 101, which thereby significantly reduces the risk of contact of fluorine gas and hydrogen gas.

Additionally, the applicants of the present invention recognized that the first absorption unit 15 and the second absorption unit 14 may produce high heat at a time of absorption of HF. In the claimed structure, since the second compartment 102 and the third compartment 103 are not provided adjacent to each other, but instead are provided adjacent to a first central compartment 101, a situation can be avoided that the second compartment 102 and the third compartment 103 would contact another compartment also having a high temperature. Thereby, the claimed invention also provides a benefit of increasing the efficiency of heat dissipation and avoiding a possible dangerous situation caused by overheating.

In the two noted chambers in Fumio (JP '390) O<sub>2</sub> and H<sub>2</sub> are respectively generated, which also accompanies heat. However, the absorption of HF is a chemical reaction in which an energy level is decreased, and a heating value in absorption of HF is far larger than that in the generation of O<sub>2</sub> of H<sub>2</sub>. Thereby, avoiding a problem of generation of high heat is not a significant factor in Fumio (JP '390).

None of the applied art recognizes such problems or overcomes such problems with a structure such as claimed in which:

said first compartment is located between said second compartment and said third compartment so that said second compartment and said third compartment are not in contact with each other.

None of the cited art discloses or suggests achieving the benefits of the claimed invention noted above, nor the structure discussed above and as positively recited in the claims to realize such benefits.

Moreover, the Appellants of the present invention further recognized that in a fluorine gas generator as claimed, the first compartment 101 is likely to have high pressure because raw material gas is supplied thereto. Meanwhile, the second compartment 102 and the third compartment 103 are likely to have low pressure because generated gas is discharged thereto.

In a case in which, such as in the device of Tojo, there is no partition between a supply system compartment and a discharge system compartment, and a second compartment (discharge system) and a third compartment (discharge system) are arranged so that a first compartment (a supply system) is interposed therebetween, that is the first compartment is sandwiched by the second compartment and a third compartment, such an arrangement increases a possibility of a gas leakage from the first compartment (the supply system) to the second and third compartments (discharge systems). In such a situation a gas leakage may cause a differential pressure between the supply system compartment (the first compartment) and a discharge system compartment (the second and third compartments).

The claimed structure has a contrary structure than in Tojo as that in the claim structure the first, second, and third compartments are separated from each other by internal partition walls 105, 106.

Further, the claimed structure provides additional benefits not recognized by any of the applied art and not relevant to the applied art. In the fluorine gas generator as claimed,

different types of gases are utilized. In the second compartment hydrogen fluoride is absorbed from fluorine gas, in the third compartment hydrogen fluoride is absorbed from hydrogen gas, and a first compartment contains an electrolyzer, which as a non-limiting example would be supplied a raw material such as anhydrous hydrogen fluoride. Therefore, the box-shaped body containing such different devices as the electrolyzer, first absorption unit, and second absorption unit are divided into compartments. Specifically: the first compartment includes the electrolyzer, the second compartment includes the absorption unit, and the third compartment including the second absorption unit. Such a division in compartments prevents gases leaked from the respective compartments from mixing with one another, and in addition it enables each compartment to be directed to dealing with only one type of gas, which makes it easier to perform partial maintenance in replacement of device components for each component. As a result safety is advantageously improved.

Moreover, in such a fluorine gas generator if even a small amount of fluorine gas is mixed with a small amount of hydrogen gas, an explosion would not immediately occur but merely hydrogen fluoride would be produced. However, the involvement of oxygen into such a process could cause an explosion. Therefore, providing a structure as claimed that can prevent leaked fluorine gas from mixing with hydrogen gas, a possibility of an explosion can be reduced and safety can be improved.

Accordingly, in the claims as written the box-shaped body includes a first compartment including the electrolyzer, a second compartment including the first absorption unit, and the third compartment including the second absorption unit, so that leaked gases in the respective compartments are not mixed with each other. As a result, leaked fluorine gas is not mixed with hydrogen gas, which eliminates the possibility of an explosion and

improved safety. Such a structure makes it possible to easily perform maintenance in replacement of device components for each component. Also advantageously only one type of gas has to be dealt within each compartment.

None of the applied art discloses or suggests the specific structure of the claimed first, second and third components with the specific noted elements therein.

**Claim 3 recites a further structure that further distinguishes over the applied art as the applied art does not disclose or suggest “the first to third components as provided with a suction opening for suctioning the internal air”.**

Independent claim 3 further recites “each of the first to third components 101, 102, 103 is provided with a suction opening 41, 42, 43 for suctioning the internal air”, see Figure 2 in the present specification. Applicants submit that additional feature recited in dependent claim 3 further distinguishes over the applied art.

With respect to the above-noted feature in dependent claim 3 the outstanding Final rejection cites Tojo at Figure 1 noting the use of an exhaust opening 19.


Such a structure in Tojo clearly does not correspond to the claimed features in which each of the first to third components 101, 102, 103 is provided with its own suction opening 41, 42, 43. The use of a single exhaust opening 19 in Tojo clearly does not correspond to that claim structure. Thereby, independent claim 3 recites additional features that further distinguish over the applied art.

VIII. CONCLUSION

The above-noted rejection pending in the Final Office Action is improper and must be REVERSED.

Respectfully submitted,

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## IX. CLAIMS APPENDIX

Claim 1 (Appealed): A fluorine gas generator comprising:

a box-shaped body containing an electrolyzer for fluorine gas generation, said box-shaped body being partitioned into at least three compartments separated from each other by internal partition walls such that gases in the at least three compartments do not mix together, including:

a first compartment containing said electrolyzer;

a second compartment containing a first adsorption unit that adsorbs hydrogen fluoride from fluorine gas discharged from an anode chamber of the electrolyzer; and

a third compartment containing a second adsorption unit that adsorbs hydrogen fluoride from hydrogen gas discharged from a cathode chamber of the electrolyzer,

wherein said second compartment and said third compartment are respectively provided directly adjacent to said first compartment, and said first compartment is located between said second compartment and said third compartment so that said second compartment and said third compartment are not in contact with each other.

Claim 2 (Appealed): A fluorine gas generator comprising:

an electrolyzer containing an electrolytic bath composed of a mixed molten salt containing hydrogen fluoride and divided into an anode chamber with an anode disposed therein and a cathode chamber with a cathode disposed therein,

a first adsorption unit that adsorbs hydrogen fluoride from the fluorine gas discharged from the anode chamber,

a second adsorption unit that adsorbs hydrogen fluoride from the hydrogen gas discharged from the cathode chamber, and

a box-shaped body containing the electrolyzer, the first adsorption unit, and the second adsorption unit,

said box-shaped body comprising three compartments separated from each other by internal partition walls such that gases in the at least three compartments do not mix together, and including a first compartment containing said electrolyzer, a second compartment containing said first adsorption unit, and a third compartment containing said second adsorption unit,

wherein said second compartment and said third compartment are respectively provided directly adjacent to said first compartment, and said first compartment is located between said second compartment and said third compartment so that said second compartment and said third compartment are not in contact with each other.

Claim 3 (Appealed): The fluorine gas generator according to Claim 2, wherein each of the first to third compartments is provided with a suction opening for suctioning the internal air.

Claim 4 (Appealed): The fluorine gas generator according to Claim 2 or 3, wherein said second compartment contains a reservoir tank for storing the fluorine gas after passing through said first adsorption unit and a pressurizing device configured to pressurize the fluorine gas from said reservoir tank.

Claim 5 (Appealed): The fluorine gas generator according to Claim 2, wherein said first compartment contains a water heating device for feeding warm water to said electrolyzer for heating said electrolyzer.

Claim 6 (Appealed): The fluorine gas generator according to Claim 2, wherein said electrolyzer is mounted on a transporting member capable of entering and leaving said first compartment.

Claim 7 (Appealed): The fluorine gas generator according to Claim 6, wherein said first adsorption unit comprises at least two adsorption columns, wherein each adsorption column can be operated alone or more than one adsorption column can be operated simultaneously, and each of the adsorption columns is mounted on a transporting member capable of entering and leaving the second compartment.

Claim 8 (Appealed): The fluorine gas generator according to Claim 6, wherein said second adsorption unit comprises at least two adsorption columns, wherein each adsorption column can be operated alone or more than one adsorption column can be operated simultaneously, and each of the adsorption columns is mounted on a transporting member capable of entering and leaving the third compartment.

Claim 9 (Canceled).

Claim 10 (Appealed): The fluorine gas generator according to claim 1, wherein said box-shaped body is formed as a unit.

Claim 11 (Canceled).

Claim 12 (Appealed): The fluorine gas generator according to claim 2, wherein said box-shaped body is formed as a unit.



X. EVIDENCE APPENDIX

None.

XI. RELATED PROCEEDINGS APPENDIX

None.